RESPONSE OF *BACTROCERA CUCURBITAE* FEMALES (DIPTERA, TEPHRITIDAE) TO CUCURBIT HOST FRUIT ODOURS

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Introduction

Bactrocera cucurbitae is one of the major pests of cucurbits in many countries throughout the world. Its current distribution ranges from Asia to many Pacific Islands (including Hawaii), the Seychelles, East and West Africa, Mauritius and Reunion. Damage is caused by oviposition of females on fruit and development of larvae. Losses of production can reach 90% in La Réunion [1].
Finding and selecting suitable targets for egg laying is a key issue for reproductive success in this species. Fruit-seeking females are attracted at medium distance by a blend of volatiles emitted by host plant. Attraction of melon fly for cucumber has been studied in Hawaii [2], but no other study has been carried out on the olfactive attractiveness of other host plants for *B. cucurbitae.*

The aim of the study is to determine for a wide range of host plants:

- the attractiveness for melon fly in small test cages
- the volatiles compounds emitted with SPME/ GC-MS

Host fruits


1= Coccinia grandis (ivy gourd)


5= Cucurbita moschata (giromon)


9= Cucurbita moschata (butternut squash)


13= Momordica charantia (bitter gourd-cultivated variety)


2= Cucurbita maxima (pumpkin)


6= Cucurbita moschata (pumpkin)


10= Cucumis melo (muskmelon)


14= Citrullus lanatus (watermelon)


3= Cucurbita pepo (pattypan squash)


7= Trichosanthes cucumerina (snake gourd)


11= Momordica charantia (bitter gourd- Indian variety)


15= Cucumis sativus (cucumber)


4= Cucurbita pepo (zucchini)


8= Luffa acutangula (angled luffa)

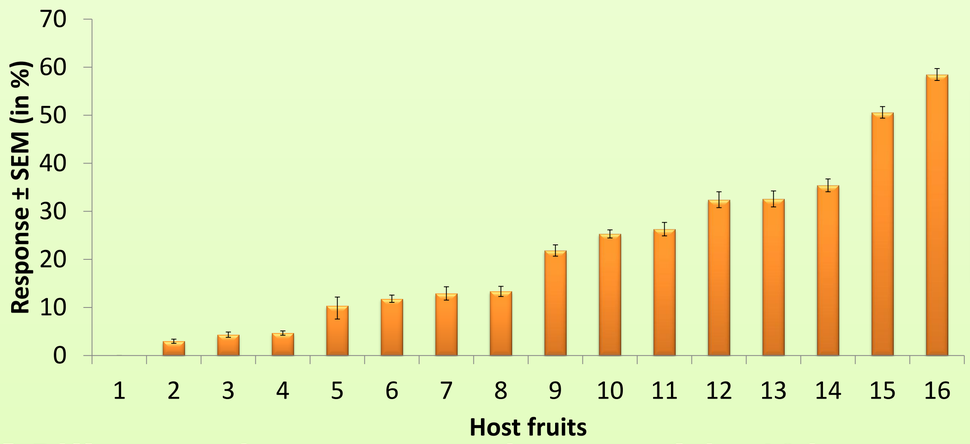

12= Momordica charantia (bitter gourd- wild variety)


16= Luffa cylindrica (sponge gourd)

Response to host fruit volatiles

12 small test cages placed in a climatic chamber (25°C-60% H.R.) with cohorts of 30 reared females of 25 to 30 days-old
In each cage, 2 “trap boxes” are placed: one with 30g of pieces of fresh mature fruit and one without odour (control)

Number of flies captured in each “trap box” were counted 2 hours after exposure



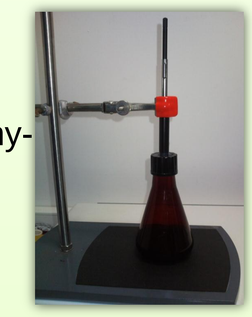
➔ **<u>Differences between attractiveness of the 16 host mature fruits</u>**
4 groups according to their attractiveness for *B. cucurbitae*:
1) Most attractive fruits (50-60% of response): *L. cylindrica* and *C.sativus*
2) ***25-35%*** **of response:** *M. charantia* (3 varieties), C. *lanatus* , *C. melo and C. moschata* (butternut)
3) ***10-15%*** **of response:** L*. acutangula , T. cucumerina* ,*C. moschata* (giromon and pumpkin)
4) **Less attractive fruits (<5%):** *C. pepo* (zucchini and pattypan squash), *C. maxima, C. grandis*

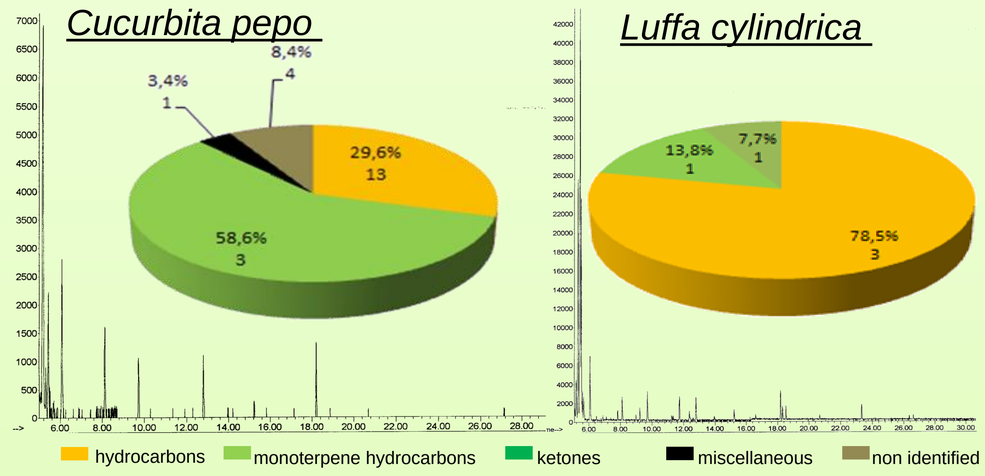
➔ **<u>For a given species</u> : strong differences** of attractiveness according to phenological stage and maturity

Chemical study on host fruit volatiles

Volatile compounds of fresh fruit are collected using a solid-phase microextraction (SPME) dynamic headspace sampling method (DBB-Carboxen-PDMS fiber) and identified by gas chromatography-mass spectrometry

Collection of volatiles from entire fruits (*in situ*) and from pieces of fruit


SPME collection: pieces of fruit




SPME collection: fruit *in situ*

➔ Strong differences of chemical composition exist between the volatiles emitted by the different Cucurbitaceae

➔ Strong differences of chemical composition exist between the type of collection (entire fruit / pieces of fruit)

➔ On-going analysis on the possible existence of specific compounds in certain attractive cucurbit species and on the qualitative differences between species

Conclusion

Small test cages ➔ good tool to evaluate the relative attractiveness of different host fruits
Chemical study ➔ identification of volatile compounds emitted by the fruit of various cucurbit species
Further studies : select candidate compounds for further behavioural tests (isolated or in blends)

References cited:
[1] Vayssières JF (1999). PhD thesis.
[2] Siderhurst MS & Jang EB (2010). Journal of Chemical Ecology

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